Reflections on 100 years of Pandemic Flu and other Emerging Infections (and the challenges to Africa CDC and its partner public health institutes)
Influenza virus: the reservoir in nature

Order Anseriformes (waterfowl) (ducks, geese and swans)

Order Charadriiformes (shorebirds and gulls)

Modified from Webster et al., Microbiol Rev 1992 – Gülşah Gabriel
...infects many species directly

Adapted from Horimoto and Kawaoka, CMR, 2001
...some have pandemic potential because they are unstable genetically

Nachbagauer and Krammer, CMI, 2017
.....and therefore shift antigenically to cause new virus types

source: http://www.influenzacentre.org/aboutinfluenza.htm
antigenic drift and shift occur in humans

Source: Florian Krammer
......and are known to cause severe influenza virus-related disease each flu season

Germany 2014/15: 20,000 deaths (excess mortality)

Europe (15 countries) 2014/15: 217,000 deaths (excess mortality, EuroMOMO)

ICU admissions in eight EU countries per season (ECDC):

[Diagram showing ICU admissions per season from 2013-14 to 2016-17]
.....and periodically emerge as pandemic.

2009 H1N1 strain

Classical swine  North American avian  Human (H3N2)  Eurasian avian-like swine

PB2 - North American avian
PB1 - Human H3N2
PA - North American avian
H1 - Classical swine
NP - Classical swine
N1 - Eurasian avian-like swine
M - Eurasian avian-like swine
NS - Classical swine
# Seasonal vs. pandemic influenza mortality burden

<table>
<thead>
<tr>
<th></th>
<th>Estimated Deaths Globally</th>
<th>Mean Age of Deaths (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual influenza</td>
<td>145,000 [LRTI]&lt;sup&gt;1&lt;/sup&gt; 290,000 – 650,000 [any respiratory]&lt;sup&gt;2&lt;/sup&gt;</td>
<td>76 (1976-2001, H3N2)</td>
</tr>
<tr>
<td>2009 pandemic&lt;sup&gt;3&lt;/sup&gt;</td>
<td>150,000 – 575,000</td>
<td>40</td>
</tr>
<tr>
<td>1968 pandemic&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1,000,000</td>
<td>62</td>
</tr>
<tr>
<td>1957 pandemic&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1,100,000</td>
<td>65</td>
</tr>
<tr>
<td>1918 pandemic&lt;sup&gt;3&lt;/sup&gt;</td>
<td>50,000,000</td>
<td>27</td>
</tr>
</tbody>
</table>

<sup>1</sup>GMD 2017 Influenza Collaborators Lancet Respir Med 2018. NOTE: Represents LRTI deaths attributed to influenza, 2017
Influenza virus vaccines

- **Inactivated vaccines**
  - Produced in eggs or cell culture

- **Live-attenuated cold-adapted vaccines**
  - US or Russian backbone
  - Currently produced in eggs

- **Recombinant protein vaccines**
  - Produced in insect cells

Picture credits: [www.whitehouse.gov](http); [www.pulseheadlines.com](http); [www.proteinsciences.com](http)
6 month period required for a matched influenza vaccine

Current influenza immunization policies

Table 2
WHO Member States with influenza immunization policies in 2014, by WHO region.

<table>
<thead>
<tr>
<th>Region</th>
<th>Member States</th>
<th>Has national influenza immunization policy n,%</th>
<th>Targets children n,%</th>
<th>Targets adults with chronic illness n,%</th>
<th>Targets pregnant women n,%</th>
<th>Targets health care workers n,%</th>
<th>Targets elderly n,%</th>
<th>Targets other groups n,%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa (AFR)</td>
<td>47</td>
<td>3 (6%)</td>
<td>2 (4%)</td>
<td>3 (6%)</td>
<td>3 (6%)</td>
<td>3 (6%)</td>
<td>3 (6%)</td>
<td>2 (4%)</td>
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<tr>
<td>Americas (AMR)</td>
<td>35</td>
<td>31 (88%)</td>
<td>22 (63%)</td>
<td>20 (57%)</td>
<td>21 (58%)</td>
<td>23 (66%)</td>
<td>18 (51%)</td>
<td>14 (40%)</td>
</tr>
<tr>
<td>Eastern Mediterranean (EMR)</td>
<td>21</td>
<td>12 (57%)</td>
<td>6 (29%)</td>
<td>11 (52%)</td>
<td>8 (38%)</td>
<td>10 (48%)</td>
<td>9 (43%)</td>
<td>12 (57%)</td>
</tr>
<tr>
<td>Europe (EUR)</td>
<td>53</td>
<td>51 (96%)</td>
<td>12 (23%)</td>
<td>33 (63%)</td>
<td>34 (64%)</td>
<td>37 (70%)</td>
<td>39 (74%)</td>
<td>29 (55%)</td>
</tr>
<tr>
<td>South-East Asian (SEAR)</td>
<td>11</td>
<td>2 (18%)</td>
<td>2 (18%)</td>
<td>2 (18%)</td>
<td>2 (18%)</td>
<td>2 (18%)</td>
<td>2 (18%)</td>
<td>2 (18%)</td>
</tr>
<tr>
<td>Western Pacific (WPR)</td>
<td>27</td>
<td>16 (59%)</td>
<td>8 (30%)</td>
<td>12 (44%)</td>
<td>12 (44%)</td>
<td>15 (56%)</td>
<td>15 (56%)</td>
<td>8 (30%)</td>
</tr>
<tr>
<td>Worldwide</td>
<td>194</td>
<td>115 (59%)</td>
<td>54 (28%)</td>
<td>89 (46%)</td>
<td>81 (42%)</td>
<td>91 (47%)</td>
<td>87 (45%)</td>
<td>62 (32%)</td>
</tr>
</tbody>
</table>

Notes: Data source is 2014 WHO/UNICEF Joint Reporting Form (JRF) augmented by policy data from regional surveys [10,11,13,14].

Ortiz JR. Vaccine. 2016.
Influenza among pediatric respiratory infections, Africa, 1980-2009

Figure 6: Proportion of tested samples with identification of respiratory viruses in children admitted to hospital with acute respiratory infection in sub-Saharan Africa, from reviewed studies published between 1980 and 2009

Seasonal influenza epidemiology in sub-Saharan Africa: a systematic review.
Gessner BD, Shindo N, Briand S.
Reported seasonal influenza, Madagascar, Senegal and South Africa


Seasonal influenza epidemiology in sub-Saharan Africa: a systematic review.

Gessner BD, Shindo N, Briand S.
Influenza outbreak in Madagascar

The Ministry of Health, assisted by the Institut Pasteur and a team from the Global Outbreak Alert and Response Network investigated a mystery disease in the highlands of Madagascar in July and August 2002. They identified the agent as influenza A virus subtype H3N2. The team assessed the epidemiological situation and provided antimicrobials for case management, rapid diagnostic tests and laboratory equipment. A daily reporting system was introduced.

Despite this work, over 800 deaths were reported and the high fatality rate raised concern that the influenza virus might be a particularly virulent strain. However, the virus was rapidly characterized by the WHO influenza network as an epidemic strain previously detected in various parts of the world. WHO is working with the Ministry of Health to continue to strengthen the surveillance and reporting systems, to ensure antibiotics are available at health centres and to improve recognition of the symptoms of influenza among both health workers and the general public.

See reports in Disease Outbreak News and in the Weekly Epidemiological Record.
Countries publishing data regarding influenza, 1980-2009
Challenges for CDC Africa and its partner public health institutes

• Burden of influenza: morbidity and mortality – would vaccination be useful
• Risk factors for serious illness
• Populations at risk
• Causes of respiratory deaths in elderly populations and monitoring for excess pulmonary death
Plague in Madagascar, 2017

The diagram shows the number of cases of plague categorized by type (pneumonic, bubonic, septicemic, not specified) against the date of symptoms onset. The highest number of cases occurred in late September and early October.
Plague

Plague is caused by Yersinia pestis bacteria. Blood sucking fleas transmit the bacteria among animals, and various species of rodents can become infected.
PLAGUE – transmission cycle

Figure 27.15 Brock Biology of Microorganisms 11/e © 2006 Pearson Prentice Hall, Inc.
PLAGUE – clinical presentation

Bubonic plague
PLAGUE – clinical presentation

Pneumonic plague
PLAGUE – world-wide distribution (reported)

- 2010 to 2015: 3248 cases, 584 deaths reported worldwide
- Countries reporting most cases: Democratic Republic of the Congo, Madagascar, and Peru.
- Distribution: endemic in rural areas with occasional urban outbreaks
PLAGUE OUTBREAK MADAGASCAR, 2017

2,348 reported cases/202 (8.6%) reported deaths
81 healthcare workers/0 deaths

Source: WHO
Swiss cheese events in epidemiology and public health

James Reason: BMJ 2000;320:768-770
Highly mobile population – road transport crowded – frequent interchange between urban and rural areas
PNEUMONIC PLAGUE - first reported case, pneumonia death in 47 year old female, Tomatave, August 2017

Sat next to 31 year old male who became ill/died during journey in collective taxi between Ankazobe and Toamasina Districts.
PNEUMONIC PLAGUE – beginning of epidemic, August, 2017

Source: WHO
PLAGUE MADAGASCAR – mixed bubonic and pneumonic

Clinical presentation | Confirmed + Probable
--- | ---
P. Bubonic | 139
P. Pneumonic | 418
P. Septicaemic | 1
unknown | 39
Total | 597

507 confirmed cases

Source: WHO
37 isolated strains sequenced
• Bubonic: 29 isolates, antigenically similar to endemic strains isolated in previous years
• Pneumonic: 8 isolates, genetically diverse

Source: Randremanana, Lancet ID, in press
RODENT CONTROL – a major challenge

- Rodents source of protein in rural areas – close contact humans and rodents/fleas
- Poor sanitation, especially in urban areas
- Absence of urban rodent control measures
- Killing rodents while fleas still alive spreads to new reservoirs/humans
Challenges for CDC Africa and its partner public health institutes

- Does plague exist and cause deaths in other parts of Africa than those that regularly report
- Is there a need for point of use diagnostic tests
- What are the best tools for rodent control – can plague be prevented
- What are the factors that lead to pneumonic transmission
SARS-like respiratory syndrome, Saudi Arabia, August 2012

Coronavirus: is this the next pandemic?

Last September a doctor in a Saudi hospital was fired for reporting a new, deadly strain of the coronavirus. Now, with half of all confirmed cases ending in death, the World Health Organisation has issued a global alert and scientists are preparing for the worst.

- Coronavirus victim’s widow tells of grief

Ian Sample
The Guardian, Friday 15 March 2013 20.06 GMT
Jump to comments (186)
SARS-like respiratory syndrome, London, September 2012
Patient with SARS-like respiratory syndrome, St Thomas’, London

49 year-old previously well Qatari male

Exposures
- Travel to Mecca with family and friends 31 Jul - 18 Aug
- Possible mild respiratory illnesses in family during 18 Aug - 3 Sep
- Visit to own farm in Qatar (camel, sheep) 18 Aug - 3 Sep

Course of illness
- Severe respiratory illness requiring hospitalisation 9 Sep
- Intubation and ventilation required 11 Sep

Microbiology
- Common causes of viral and bacterial pneumonia not detected
- Novel coronavirus detected nasal swab 13 Sep
- Confirmed novel coronavirus 2012 (later named MERS coronavirus)

Clinical Course
- Remained on ECMO 12 months - deceased
Cluster of nCoV cases, UK, December 2012 – February 2013

Source: Eurosurveillance, Volume 18, Issue 11, 14 March 2013
MERS coronavirus: international spread, 2012 - 2015
MERS Coronavirus worldwide, September 2016

MERS-CoV detection around the world

27 countries have had an imported detection
13 have supported local transmission

MERS-CoV detected at site

- most countries via importation

- Yellow: 0
- Green: 1-10
- Blue: 11-50
- Orange: 51-250
- Red: 251-1500

Local transmission
Positive camels
Dromedary camel, presumed reservoir with nasal carriage,

Geographic distribution of MERS coronavirus among dromedary camels, Africa.

Challenges for CDC Africa and its partner public health institutes

• How does the MERS coronavirus transmit from camels to humans
• Are humans infected in African countries – if so what is the burden
• Is there a need for point of use diagnostic tests
• Is there a need for a human vaccine
• If there were a camel vaccine would transmission to humans still occur
Lassa Fever belt, Sub-Saharan Africa

LASSA FEVER DISTRIBUTION MAP

- Blue: Countries reporting endemic disease and substantial outbreaks of Lassa Fever
- Green: Countries reporting few cases, periodic isolation of virus, or serologic evidence of Lassa virus infection
- Gray: Lassa Fever status unknown

Legend:

- 0 240 480 960
- Miles
Nigeria CDC and Lassa reports – filling gaps in the knowledge base

National Disease Outbreak Dashboard 2006 - 2018 (All Diseases)

1,441 cases were reported
21 states were affected
164 LGAs were affected
Lassa Fever Nigeria, 2017

NCDC Lassa fever outbreak weekly Situation Report No. 22–June 16, 2017

Highlights

- In the current Lassa Fever outbreak, seventeen (17) states (Ogun, Bauchi, Plateau, Edo, Ondo, Enugu, Taraba, Nasarawa, Rivers, Kaduna, Gombe, Cross River, Benue, Katsina, Kogi, Imo and Anambra) have reported at least one confirmed case — Figure 1.
- As of week 24 (June 10–16, 2017), the outbreak is active in 7 states (Anambra, Bauchi, Cross River, Edo, Gombe, Taraba and Plateau). Nasarawa and Kano states have completed 42 days follow-up (two incubation periods) with no new confirmed case reported and the outbreak is over in these states.
- Since the onset of LF outbreak in Dec. 2016 (Week 48), a total of 191 cases have been classified as: confirmed* (277) and probable† (14) with 73 deaths (59 deaths in confirmed and 14 in probable) recorded.
- Case fatality rate in confirmed and probable cases is 30.9% and 20.0% for all cases (including probable, confirmed and suspected).
- In the reporting Week 24 (June 10–16, 2017), four (4) new suspected cases were reported in Plateau (3) and Anambra (1) states. Two (2) new confirmed cases were reported in Edo (1) and Ondo (1) states. No death was recorded this week.
- There are four (4) pending results for suspected cases in Bauchi (1) and Plateau (3) states.

* "Active" means there has been at least one confirmed case, and contacts within 21 days post-exposure.
† Any suspected case with laboratory confirmation (positive IgM antibody, PCR or virus isolation).
# Any suspected case (see definition above) but who died without collection of specimen for laboratory testing.

NCDC contact: Twitter & Facebook @NCDCgov. Toll free number: 08009700000.
Current research and recommendations for Lassa control

Lassa fever outbreaks in Nigeria

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ARTICLE HISTORY Received 14 July 2018; Accepted 14 August 2018

KEYWORDS Case management capacity; dedicated surveillance and treatment centers; Lassa fever; Nigeria; progress in control; trends of the outbreaks

1. Introduction

First described from Nigeria in 1969 [1], Lassa fever (LF) is not new here but continues to manifest in epidemic proportions and as endemic or sporadic outbreaks. Recent data show both the increasing occurrence of sporadic outbreaks and the continued spread across the country [2–3].

Neither the morbidity nor mortality from LF in Nigeria is insignificant. About 6% of febrile adults [4] and 3.5% of acutely febrile ill children [5] in endemic areas have confirmed infections. Even with improved supportive care and treatment with ribavirin [6], case fatalities were still as high as 24–33% in tertiary hospital settings in recent times [7–8] while about 13.5% of survivors have sensorineural hearing loss [9]. Besides these, LF accounts for about 2.2% of hospital maternal mortality in endemic areas [10].

Unfortunately, LF control was until quite recently neglected in Nigeria. This failure allowed the outbreaks to gain in frequency and severity with many deaths, including that of health-care workers [11]. Prof. Tomori put the scenario in sharp focus in a remark in 2007 thus, “Talking about these last thirty-eight years of Lassa fever in Nigeria, is telling of the tragedy of a nation. The story of Lassa fever in Nigeria is the story of criminal apathy and vicious ignorance” [12].

Thus there are many questions to which urgent answers are needed in addressing the challenge of LF in Nigeria and the West African sub-region. Among them, we shall focus on the two we consider most critical: Why has progress in LF control seemed elusive? And, which issues should be foremost in rising to the challenge?

2. Slow progress in LF control in Nigeria and the West African sub-region

A combination of factors could be responsible. Since LF became known, there had been only little decisive effort by national governments and international health agencies and organizations (IHACOs). There had also been only little sub-regional cooperation. Where efforts were made to draw attention to the onslaught of the outbreaks, there was no follow-up action to ensure successful implementation of the programs of action. In this regard, the December 2007 sub-regional conference [12] and the Freetown meeting of 2011 are apt examples.

The National Lassa Fever Stakeholders’ Forum of Nigeria was formed in 2007. The Forum organized the first sub-regional conference in December and the same year and lack of laboratory infrastructure for surveillance, a low clinical index of suspicion, erratic supply of ribavirin, poor clinical case management capacity, and lack of political will were identified as the major challenges bedeviling Nigeria’s response [12]. The program of action drawn up at the end of the conference included the establishment of LF viral hemorrhagic fever (VHF) diagnosis and treatment centers at strategic locations in the country [12] to address the issues of surveillance and care management challenges but it was not implemented. Similarly, other plans of action drawn up by successive National Lassa Fever Control Committees met with the same fate.

Thus, almost a decade after the conference and in the wake of an increasing number of deaths during the 2016 outbreak [2], the establishment of strategically located diagnostic laboratories for the purpose of surveillance was still the subject of discussion. And 2 years later during the 2018 outbreak, one of the few functional LF diagnostic centers at Ibadan Specialist Teaching Hospital (ISTH) was virtually overwhelmed by the pressure of requests from other parts of the country. The endemic weak response, non-prioritization, and non-acknowledgment by government of the outbreaks of LF as a significant public health problem partly explains why IHACOs also did not give the outbreaks serious attention over the years.

The Freetown meeting was convened by the World Health Organization (WHO) and involved LF affected and at-risk countries. These jointly developed a five-year strategic plan (2012–2017) for the prevention and control of LF and other severe Emerging Infectious Diseases in the sub-region. Although signed subsequently as a declaration of collaboration by Health Ministers during the 61st session of WHO/Africa Regional Office Regional Committee Meeting at Yamoussoukro, Côte d’Ivoire in September 2013, little or none of the plans were executed.

The lack of significant progress in LF control in Nigeria could be traced to a number of factors. First, laboratory
Vector control a mainstay of prevention, but risk for children
PPE adapted for use in tropical climates
Limited safe rodent elimination strategies
Challenges for CDC Africa and its partner public health institutes

• Are all the risk factors for human infections known
• Is there a need for a human vaccine to prevent infection
• Are there sufficient point of use diagnostic tests
• What measures are most effective in rodent control and grain protection in households
• Are there other possible interventions to prevent human infection
Ebola virus, electron micrograph, 1976

Source: CDC
Patient record, outpatient department, Yambuku Hospital, DRC, August 1976
Hospital Implements, Yambuku, 1976
Ebola Haemorrhagic Fever by mode of transmission, Yambuku DRC, 1976

Source: CDC

Cases: 318
Deaths: 280 (88%)
Mission Hospital, Tandala Zaire (DRC), 1977

1 clinical case/died
1 contact (sister) fit possible case definition/survived

Source: WHO
## Ebola haemorrhagic fever surveillance, Zaire, 1981–1985: antibody in reported possible, probable and clinical cases

<table>
<thead>
<tr>
<th>Case definition</th>
<th>1981 (n = 0)</th>
<th>1982 (n = 4)</th>
<th>1983 (n = 36)</th>
<th>1984 (n = 27)</th>
<th>1985 (n = 31)</th>
<th>1981–1985 (n = 98)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>Clinical</td>
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<td>1</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>11</td>
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<td>Probable</td>
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<td>2</td>
<td>5</td>
<td>0</td>
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<tr>
<td>Total</td>
<td>0</td>
<td>3</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>21</td>
</tr>
</tbody>
</table>

**NOTE.** \(n\) = no. of surveillance reports investigated.

Source: WHO
Kikwit General Hospital, Zaire, 1995
Ebola Haemorrhagic Fever by mode of transmission, Kikwit Zaire, 1995

<table>
<thead>
<tr>
<th>Date</th>
<th>Cases</th>
<th>Deaths</th>
<th>% Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Mar</td>
<td>20</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>13 Mar</td>
<td>20</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>19 Mar</td>
<td>30</td>
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<td>25 Mar</td>
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<td>31 Mar</td>
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<td>6 Apr</td>
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<tr>
<td>17 Jun</td>
<td>30</td>
<td>20</td>
<td>67%</td>
</tr>
</tbody>
</table>

Source: WHO/CDC
Ebola outbreak, Ikanamongo, DRC, 2014

- Cases: 66
- Deaths: 49 (74%)
- Health workers: 8
- Duration: August-October
Ebola outbreak and health workers, Sierra Leone, May–October 2014

Source: WHO
Clinical course, Ebola virus infection, Swiss Tropical Institute, Basel

African Union, Ebola West Africa and Africa CDC

- AU: > 850 volunteers to West African outbreak
- Africa CDC: >30 volunteers to Mbandaka outbreak

Modeling tool shows intervention benefits, cost of inaction

In the MMWR report, the projection of possible EVD cases for Liberia and Sierra Leone comes from a modeling tool constructed by CDC experts. Based on previous EVD models and data from August in the countries, the tool is designed to help outbreak response planners make decisions about response steps such as isolation and safer burials; it will be freely available in a Microsoft Excel spreadsheet. CDC officials said multiple separate waves of EVD activity in Guinea made it impossible to include that country in the modeling tool.

By the end of September, cases could reach a range between 8,000 and 21,000, according to the CDC model. It calculates that by the middle of January, barring more interventions or changes in community behavior, the total in the two countries could reach about 550,000 reported cases or 1.4 million total cases, including reported and unreported ones. The higher number assumes that there are 2.5 unreported cases for each reported case.

The CDC team included several caveats with its estimate, including that the estimate reflects only what was known in August and doesn’t consider ongoing US response efforts.

Modeling calculations suggest that cases in Liberia are doubling every 15 to 20 days and that in Guinea and Sierra Leone, cases are doubling every 30 to 40 days, the CDC said.

At a media briefing today, CDC Director Tom Frieden, MD, MPH, downplayed the estimate’s use as a projection, because it is based on already outdated numbers and doesn’t consider response efforts, which he said have started to improve over the past few weeks. Rather, the model and estimates are designed to illustrate that the interventions are likely to have an important impact and send the message that the human cost of delaying the response would be very high.

"The bottom line is that the model shows a surge now can break the back of the epidemic," he said.

Gayle Smith, special assistant to President Barack Obama and senior director with the National Security Council, told reporters that the data suggest how to bend the epidemic curve but don’t take into account the response surge over the past few weeks. The United States and other key groups that are leading the response need to keep the pressure on the international community to do more, and she added that with 700 treatment unit beds being added by the United Kingdom and significant contributions from Asian countries, the African Union, and other groups, "We are starting to see a significant (response) surge."

Model show 70% isolation ‘sweet spot’

The CDC team that published the modeling report said stopping the epidemic requires isolating up to 70% of patients in treatment centers or other settings that reduce transmission, assuming that...
Field Hospital 22 Sierra Leone
Traditional village chiefs, DRC, community engagement
rVSV-ZEBOV vaccine efficacy trials, Guinea, 2015


Figure 2: Effect of health-systems failure on incidence of untreated malaria
For Guinea (A), Liberia (B), Sierra Leone (C), and the combined total (D). Pink bars show the number of cases untreated and red bars show the number of cases treated when the system is functioning normally, blue bars show additional cases caused by increases in transmission from the additional untreated cases. The green lines show the present status of the Ebola epidemic (probable and confirmed cases from patient databases), the blue lines show Ebola cases from WHO situation reports.

Ebola outbreak, 2014-2015

- Infected people from 12 countries: 28,637
- Deaths in Liberia, Guinea, Sierra Leone, Nigeria, USA, Mali, Spain and Germany: 11,315
- Cumulative pledges to Guinea, Liberia and Sierra Leone: $4.3bn

The economic impact of Ebola (GDP)
Sources: IMF, World Bank

-23.9%

2010
2011
2012
2013
2014
2015
2016 (projected)

Sierra Leone  Liberia  Guinea

Sources: WHO; CDC; MSF; New York Times
Requirements, International Health Regulations

- Strengthened national core capacity for surveillance and control
- Mandatory reporting of possible public health emergency of international importance (PHEIC)
- Emergency Committee to advise DG
- Global response
Challenges for CDC Africa and its partner public health institutes

• What are the best ways to ensure infection control practice in health facilities
• What are the best ways of increasing community ownership and participation in preventing and containing outbreaks
• Is it possible to shift the paradigm to rapid detection and response: containment at the source
• Will bilateral and multilateral donors increase their investments for national core capacity strengthening in addition to their contributions to a global safety net
Africa CDC can and must lead the way

How Africa can quell the next disease outbreaks

As mobility increases, so must investments in national public-health institutions and local leadership, says John N. Nkengasong.

This week, African and global health experts and policymakers are gathering in Addis Ababa to discuss how to enable national public-health institutions (NPHis) to keep emerging and re-emerging infectious diseases in check. As the top of the agenda must be empowering local leadership to act fast.

Africa’s population is expected to double from 1.2 billion now to 2.4 billion by 2050. People are travelling greater distances, too. Last year, Ethiopian Airlines alone transported more than 100 million passengers — a 12% rise from 2017. African ambitions to establish free trade and travel across the continent will increase movement even more. Although economically advantageous, these trends could set the stage for HIV, Ebola, pandemic influenza, dengue, yellow fever and arbovirus and resistant bacterial infections to spread further and faster.

Waiting for emergency help from the West costs lives and money. African leaders are starting to take ownership of investments in their citizens’ health, but fewer than 15 countries on the continent currently have institutions that can perform the functions of an effective NPHis, such as disease surveillance linked with a diagnostic laboratory, and the capacity to activate a rapid response team for outbreaks and serve as an operation centre in public-health emergencies. At head of the Africa Centre for Disease Control and Prevention (Africa CDC), I call on all 55 member states to establish or strengthen NPHIs.

And I urge the private sector in Africa and worldwide, and bodies everywhere, to invest in these efforts. According to the World Bank, Africa needs between US$4 billion and US$5 billion a year for epidemiological preparedness. In 2015, 18 African nations received from various donors about N500 million for this.

I think that much of the gap can be filled from within Africa, where the 2014–15 Ebola outbreak cost roughly US$30 billion. The African Business Coalition for Health, formed in 2017, and the United Nations Economic Commission for Africa are encouraging investment and coordinating efforts by African philanthropists and business leaders to support health programmes. The African Union (AU), a 55-member continental organization based in Addis Ababa, has set up a programme to tax imports of goods to Africa, designed to shift AU revenue costs away from countries. A fraction of these funds should go towards NPHIs.

NPHis are critical to ensuring health care is accessible and affordable. They are also essential for health systems. NPHis are crucial to ensure health care is affordable. They are also essential for health systems.

The moment felt like a game-changer — it established a mechanism to move forward where none had existed. Three of the biggest turning points in the fight against HIV started with similar proclamations, each catalysing action. In 2000, the UN Security Council declared that the AIDS epidemic was an international security threat; in 2011, Kofi Annan, then UN secretary-general, called for a global AIDS fund; and in 2003, the President’s Emergency Plan for AIDS Relief was launched by then-U.S. president George W. Bush. Nearly 750,000 Africans died of AIDS-related illnesses in 2017 — but that was down by 24% since 2010 in West and Central Africa, and by 42% in East and southern Africa.

Still, no one doubts that this roadmap for pandemic preparedness requires unprecedented levels of political and financial engagement. It is difficult, but achievable.

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